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VARIETIES OF THE SATSUMA ORANGE
GROUP IN JAPAN

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VARIETIES OF THE SATSUMA ORANGE GROUP IN JAPAN.

ORIGIN OF THE VARIETY.

The cultivation of the Satsuma orange in Japan covers a long period of time, there being trees still thriving which are more than 300 years old. There it is called "Unshû Mikan," or "orange of Wenchow," a famous citrus-growing district in Chekiang, China. The name, however, does not necessarily mean that this orange is of Chinese origin. The Satsuma orange has long been known in Kiushu, the southern island of Japan, and a study of local conditions makes it seem entirely probable that it originated there, probably through natural hybridization.

Up to about 35 years ago, a mandarin orange called "Kinokuni" or "Komikan" was the only variety to reach the Tokyo market. As soon as the merit of the Satsuma orange became recognized it rapidly displaced other varieties, until by 1916 the area devoted to its cultivation, including young plantings, amounted to about 50,000 acres, the groves in bearing producing about 400,000,000 pounds of fruit annually.

Growers soon began to distinguish differences between Satsuma oranges grown in various localities. Industrial exhibitions brought together the best fruits of each district; their differences were noted, and the parent trees of prize-winning fruits were sought and used for propagation. Careful examination by competent horticulturists has confirmed in most cases the existence of these horticultural varieties substantially as recognized by the growers.

The introduction of the Owari variety is a striking instance. Previous to 1877 there was not a single tree of this variety in the central citrus area of the main island of Japan. A single introduction from the northern district of Aichi Prefecture made in that year resulted in such a rapid displacement of the Ikeda variety that within 15 years there could be found hardly a single bearing tree of the Ikeda in the central district around Wakayama.

In a similar way the local growers of Nagasaki Prefecture have specialized on their Ikiriki variety, and the Tachima growers maintain their own Tachima Mikan or Hira strain.

The six strains of the Satsuma orange here described include those located by the writer up to the end of 1912 after a thorough survey

of Japanese citrus varieties. They were studied in the field (with the exception of the Hira), and all the information possible as to the origin and history of each was obtained directly from the growers and nurserymen.

GENERAL DESCRIPTION OF THE SIX PRINCIPAL VARIETIES OF SATSUMA ORANGES.

Zairai, the primitive variety (named by the writer in 1912), also called "Chikugokei," that is, the variety most common in the Province of Chikugo, Fukuoka Prefecture. This variety originated in Fukuoka Prefecture, Kiushu Island (previously referred to as probably the home of the Satsuma orange in Japan), where there are trees still living that are more than 300 years old.

The tree is of upright habit; leaves large, with rather broad petiole wing; fruit large, flattened, fairly symmetrical; rind rough, deeply pitted, thick; segment walls thick; rag pronounced; pulp of light color, coarse, and of inferior flavor; usually seedy. See figures 1 and 2, showing the shape of the Zairai fruit and leaves.

The ripening season is later than that of the Owari and earlier than the Ikeda variety. In size and vigor of tree growth it surpasses any other strain, but the coarseness and inferior flavor of the fruit make it undesirable.

Ikeda, or Settsu variety, known among Japanese growers by the name of Ikeda-gi, Ikeda-nae, or Settsu-nae, meaning "stocks from Ikeda or Settsu districts."

This variety originated at Hosokawamura, Toyono County, Osaka Prefecture, near the city of Ikeda, Settsu Province. Up to 20 years ago the Ikeda nursery district (Toyono and Kawabe Counties) distributed Satsuma stock of this variety quite extensively, but it has of late years largely been replaced by the Owari, because of the reputation of the latter and the resulting increased demand for it.

The trees of the Ikeda variety are spreading and branched low; the foliage is rather open and hanging; leaves small, narrow, tapering, the margin near the base frequently concave; petiole wing very small; fruit small, rounded; rind coarse and thick, deeply colored, with large, conspicuous oil cells; little rag; segment walls rather thick; pulp of deep color, fine grained, of excellent flavor; seeds very few. See figures 1 and 2 showing the shape of the Ikeda fruit and leaves.

No other variety bears fruits so nearly spherical as this. The slightly pear-shaped stem end (not flattened) is characteristic. This variety usually does not show navel marking. It has a tendency to bear in alternate years, which may possibly be overcome by proper fertilization and cultivation. This is the latest ripening of all the Satsuma varieties, which is a drawback in localities subject to early frost. The fruit is, however, rated as of excellent quality in Japan and is a good keeper, being stored in large quantities for sale in the early spring, through March and April.

There are a number of strains of the Ikeda occurring in different localities which are the result of local selection.

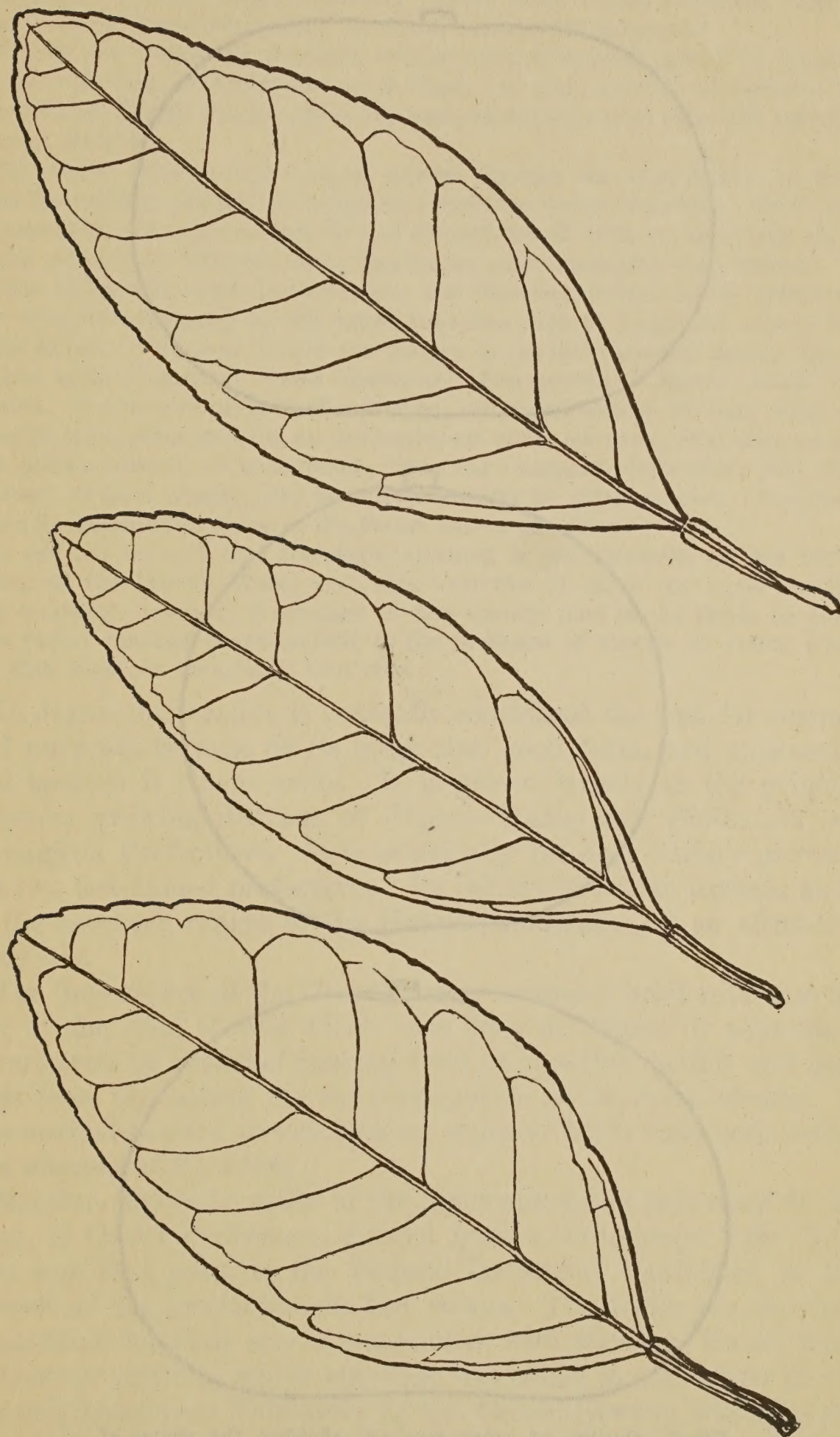


FIG. 1.—Typical leaves of Satsuma orange varieties: Upper, Zairai; middle, Ikeda; lower, Owari.

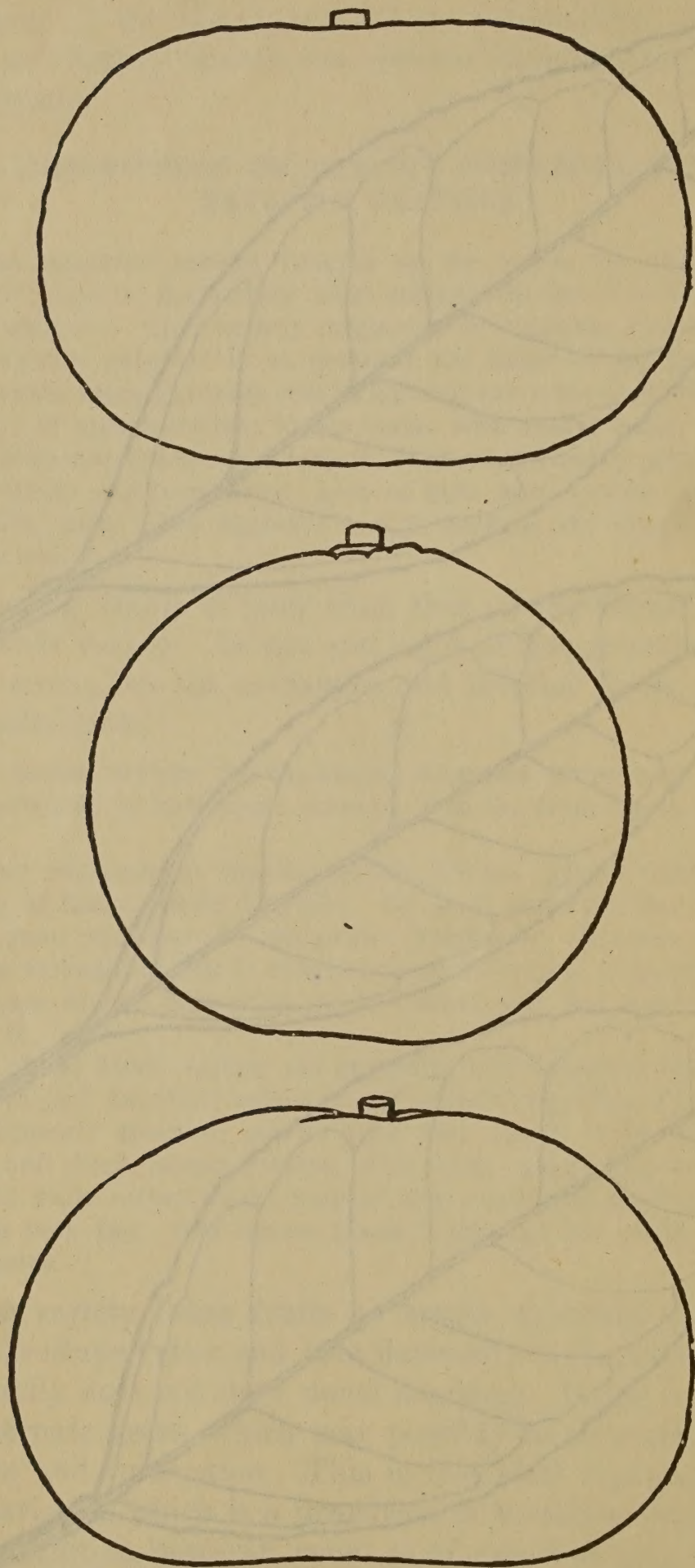


FIG. 2.—Outline of cross sections, showing the shape of typical fruits of Satsuma orange varieties: Upper, Zairai; middle, Ikeda; lower, Owari.

Owari variety, known among Japanese growers by the names Owari-nae, Bishû-nae, or Owari Unshû, meaning "stocks from Owari Province," and frequently called "Kairyô Unshû," meaning "improved Satsuma."

This is the variety of Satsuma orange most commonly grown in Japan at the present time. Its history is not clear. It may possibly be derived from the Goyu or Nezaki Unshû, which has been cultivated for at least 150 years in a near-by district.

The Owari variety first became known through the distribution of stocks from the nursery district of Nakajima County in Owari Province. Until about 20 years ago it was grown only in this district, but in 1902 stocks of this variety to the number of 1,750,000 were distributed quite generally over Japan.

Tree of upright habit, branches few and vigorous, foliage dense, rather stiff and upright, especially on the upper branches; leaves large and broad, especially broad at the base, where the margin is convexly curved, deeply colored, petiole wing of medium width (narrower than petiole of Zairai; wider than Ikeda). Fruits are large and flattened, with depressions at both stem and blossom ends, often showing an inconspicuous navel marking; rind thin, smooth, and deeply colored, oil cells small; little rag; segment walls thin; pulp finely grained, of good quality, and deep color; nearly or quite seedless. See figures 1 and 2, showing the shape of the Owari leaves and fruit.

It can not be said that the navel marking is characteristic of this variety alone, as the Ikiriki, Wase, and Hira varieties all have the navel marking. The tendency, however, is stronger in this variety than in the Ikeda or Zairai. One rather marked characteristic is the presence of thorns on young plants, but this does not invariably hold true.

In Japan this variety is generally considered the best for commercial purposes because of its large size, good form, and appearance, and because it ripens early. It is grown largely in the principal Satsuma growing districts of Japan—Wakayama, Shidzuoka, and Kanagawa Prefectures. It is practically the only variety grown in the two last-named prefectures. Its culture in Japan extends as far as the northern ranges of the Hokone Mountains, at an altitude of 1,500 feet.

The importance of the Owari variety warrants brief reference to a few of the local strains which have been developed by selection of Owari trees or branches bearing fruit of superior quality and using buds from this source for the propagation of improved strains. By this method selected strains bearing superior fruits have been secured in a number of localities.

Mention should be made of the luxuriant strain cultivated by Mr. Mori, of Osaka Prefecture, secured from a nurseryman (Mr. Tate) who won first prize in the Federal Industrial Exhibition in 1903 because of the production of this strain. The fruits are especially remarkable for their size in comparison with standard Owari fruits.

Another strain to which attention was called by the writer in 1910 was originated near Shidzuoka by Mr. Seiichi Sawano, which he calls Kanro Unshû or honey Satsuma. This is characterized by the deep orange color of its rind and pulp and by extraordinary sweetness and excellent quality.

A number of the provincial citrus associations maintain their own improved strains, among which the Arita Kairyô (the improved Aita of Arita County, Wakayama Prefecture) seems to be the most prominent. This strain has leaves somewhat narrower than the common Owari type, and the fruits are remarkable for their smooth, shiny skin and excellent quality.

Wase, or early bearing variety, called "Sakigake," meaning "the leader," by growers of Hiroshima Prefecture; also called *praecox* by the writer, as a botanical form of Satsuma.

This variety originated about 25 years ago in Aoemura, Kitaamabe County, Oita Prefecture (northwestern part of Kiushu Island). It is now cultivated quite extensively over the whole country, especially on the islands of the inland sea of Hiroshima Prefecture. In Wakayama Prefecture, where the first plantation was made 18 years ago, this variety was at first regarded as of doubtful value, but it has recently gained in popularity.

The trees of the Wase, according to observations made by the writer in the original grove, are upright, rather weak, and dwarfed; leaves small, generally upright; foliage dense, tinged with yellow; fruits very large, flattened, especially at blossom end, of characteristic rectangular outline in longitudinal cross section; surface of rind smooth, slightly pitted, deeply colored when fully matured; calyx very large and strongly attached to the fruit, which usually has double rings in the rind closely surrounding the calyx; rind remarkably thin and fitting closely to the segments; oil cells large and numerous; segment walls flexible; pulp rather faintly colored; flavor only fair, mildly acid; usually seedless.

The fruit can be distinguished from that of other varieties by its peculiar marking at the stem end and by its rectangular outline. The navel marking is very conspicuous. The tree reaches maturity at an early age and bears fruit at least two years earlier than ordinary varieties. It ripens early in the season, usually two weeks earlier than the Owari variety. This behavior is well established and is characteristic of the variety. Alternate bearing seems to be rather common, and the weak growth of the tree is often mentioned as a drawback to this variety, but these defects may be eliminated in time if growers take proper care in selecting plants for propagation and use proper methods of culture.

Hira, or flat variety. Sometimes called "Tachima-mikan," or rarely "Iyo-nae," meaning "stocks from Iyo Province," but these names might include some other varieties propagated in the same district.

This variety originated in Tachimamura, Ehime Prefecture (Iyo Province) of Shikoku Island. The name Hira Unshû was first proposed by Mr. Toshi-chika Tamura, president of the Kochi Prefecture Horticultural Society, who sent the writer several specimens which showed the characteristic flatness of the fruit.

Other specimens obtained in Takahama, Tokyo, and from native growers show the same remarkable flat form, so it is safe to say that this is a distinctive characteristic of this variety.

The fruit is large, flattened, and symmetrical in form; rind fairly smooth, rather thick, not deeply colored; segments often separated by a slight cavity;

center column comparatively small; pulp of light color, coarse, of mild flavor; usually seedless, but not always so.

The writer has made no study of growing trees of this variety, but the very much flattened form of the fruit is to be considered a distinctive character. The fruit frequently shows a small navel mark, and usually one of the calyx lobes is considerably developed. This variety is believed to be a direct descendant of the Zairai or primitive variety, as the latter is cultivated in all the near-by districts.

Ikiriki variety, sometimes called "Ikiriki-mikan," meaning "citrus grown in Ikiriki district."

This variety is extensively cultivated in Ikiriki village, Nishisonoki County, Nagasaki Prefecture, where an annual crop of about 1,500,000 pounds is produced. The Satsuma orange has been cultivated for 130 years in that district, and doubtless the Ikiriki variety has originated during that time through isolation and selection of the variety best fitted to the local conditions. It is cultivated in no other place, except experimentally.

The tree is of vigorous appearance, with a thick trunk and branches and with very large, deeply colored leaves. The fruit is also very large, blossom end flattened, and this half of the fruit distinctly larger than the stem end. The tapering stem end with flattened blossom end is characteristic of this variety. The rind is deeply colored, thick, deeply pitted with large oil cells, with a large amount of soft rag; segment walls thick and soft, adhering to the pulp; pulp of pale color, fine grained, of mild flavor; usually having few seeds.

Though only a local variety, it is widely recognized as a distinct one and is highly prized by the growers of the Ikiriki district.

In the preceding pages a short account has been given of the principal varieties of the Satsuma orange known in Japan.

In November, 1917, the writer, with Mr. L. B. Scott, made an inspection of Satsuma groves and nurseries in Alabama. This inspection soon revealed that at least three of the six principal Japanese varieties were already being cultivated commercially in the Gulf coast region, the three varieties found being the Owari, Ikeda, and Zairai. Up to this time the Satsuma orange had been treated as practically a fixed variety, differences in growth and fruit characters being variously ascribed to soil conditions, methods of fertilizing, stocks, or other external influences.

To judge from Japanese experience, the American growers are fortunate in that they have propagated largely the Owari variety. It is probable that the Owari will be given first place where an early-maturing variety is desired and the Ikeda where late fruit of good quality is wanted and can be grown without too great risk of damage by cold. As the writer has pointed out in the foregoing descriptions, the Zairai is a primitive and inferior form and has been largely replaced in Japan by improved varieties, chiefly the Owari. Unless the Zairai makes a better showing under Gulf coast conditions than it does in Japan, it is probable that it will in time be supplanted in the United States, as it has been in Japan.

In addition to adopting one or more selected varieties, it will doubtless prove both desirable and profitable (as illustrated by the favorable reception accorded to certain improved strains in Japan) to select at an early date as a basis for future propagation parent trees known to produce desirable or superior fruits and to bear crops in paying quantity.

As Satsuma fruits of large size have distinct advantages when served as a breakfast fruit for eating with a spoon, tests should be made of the large-fruited Japanese strains, such as the luxuriant Mori strain of the Owari, the very flat-fruited Hira variety, and the Ikiriki variety, popular in extreme western Japan. Such forms might have even greater importance in America than in Japan, where oranges are not halved and eaten with a spoon.

The extra-early Wase variety ripens in Japan at least two weeks before the Owari, which is itself an early variety. If the Wase variety retains this early ripening habit when grown in the Gulf Coast States, it will merit a careful trial for commercial culture in spite of its dwarf nature and its tendency to bear only in alternate years, faults which may possibly be overcome by careful bud selection.

Improvement and standardization by bud selection are recognized as highly important in Japan, and the rapid growth of the Satsuma-orange industry in the last 25 years is largely the result of painstaking work on the part of Japanese nurserymen and growers along this line.

Approved:

WM. A. TAYLOR,
Chief of Bureau.

JUNE 20, 1918.

IT WAS FARMERS from whom came the first shots at Lexington, that set aflame the Revolution that made America free. I hope and believe that the farmers of America will willingly and conspicuously stand by to win this war also. The toil, the intelligence, the energy, the foresight, the self-sacrifice, and devotion of the farmers of America will, I believe, bring to a triumphant conclusion this great last war for the emancipation of men from the control of arbitrary government and the selfishness of class legislation and control, and then, when the end has come, we may look each other in the face and be glad that we are Americans and have had the privilege to play such a part.—*From President Wilson's Message to the Farmers' Conference at Urbana, Ill., January 31, 1918.*